The National Breast Cancer Audit

Report on New Zealand episodes diagnosed in 2009

Prepared by:
National Breast Cancer Audit
Australian Safety & Efficacy Register of New Interventional Procedures - Surgical (ASERNIP-S)
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Acknowledgments

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Introduction

The National Breast Cancer Audit (NBCA) was initiated in 1998 and collects data on the surgical care of early breast cancer patients in Australia and New Zealand. The audit is managed by the Australian Safety and Efficacy Register of New Interventional Procedures – Surgical (ASERNIP-S) Program, being part of the Research, Audit and Academic Surgery Division of the Royal Australasian College of Surgeons.

A Structured Query Language (SQL) query has been written to extract New Zealand data with a diagnosis date of 2009 (if a diagnosis date was not provided, the first surgery date was used) from the restored NBCA online database containing data entered up to12 September 2010. In addition to this, a dataset from Auckland Breast Cancer Register for January 2009 to June 2009 was also included in the report.

In 2009 there were 8536 cases reported to the NBCA of which 2003 were from New Zealand. Out of the 296 surgeons who contributed to the audit in 2009, 66 were from New Zealand.

In the report, percentage case volumes for New Zealand data have been reported by referral source under the following main headings:

1. Background Information
2. Invasive Tumour Characteristics
3. DCIS Tumour Characteristics
4. Breast Surgery Treatment
5. Axillary Surgery Treatment
6. Margins of excision for breast surgery
7. Radiotherapy Treatment
8. Hormonal Treatment
9. Chemotherapy Treatment
10. Herceptin® (trastuzumab) treatment

In some of the treatment sections, the relevant Australian and New Zealand clinical practice guidelines and/or NBCA Key Performance Indicators (KPIs) have been listed. The reader

can clearly see the percentage of cases which follow the guidelines and NBCA KPIs from this data.

The number of cases reported from BreastScreen Aotearoa (BSA) and other referral sources for each category were compared using chi-square test using the Statistical Package for Social Sciences software (SPSS Inc., Chicago, IL, USA). A statistical significance level of $P<0.05$ was used. (*P* value was not calculated if the number of observations per category was zero.)

Background information, tumour characteristics and breast cancer treatments that are significantly different between BSA and non-BSA referral are listed in the summary section.

Definitions of the terms provided in the report are from the National Breast Cancer Audit Data Dictionary.

In this report, ‘unknown’, ‘not yet’ and missing data are reported as ‘not known’.

1. Background Information

1a: Referral source for the New Zealand episodes

Referral source	Percentage
BreastScreen Aotearoa (BSA) (n=801)	40.0%
Non-BSA (n=1194)- Symptomatic from GP (n=1037)	51.8%
BreastScreen Australia (n=4)	0.2%
Other (n=153)	7.6%
Not known (n=8)	0.4%
Total (n=2003)	100%

Comments:
While the majority of breast cancer cases from New Zealand were referred as symptomatic from a GP (52%), BSA was the second most common referral source (40%).

Audit data used:
Information is derived from the audit question 'referral source' which allows the options of symptomatic (from GP)/BreastScreen Australia/BreastScreen Aotearoa/other.

Definitions[6]:
Referral source records the source from which the person was referred to the surgeon. Symptomatic patients are referred to a breast surgeon when presenting to a GP or other physician with symptoms such as a breast lump, pain or discharge. Patients referred from 'other' sources may include private screening programs.

1b. Invasive and DCIS episodes by referral source†

Referral source	Invasive breast cancer	DCIS
BSA (n=801)	75.78%	24.22%
Non-BSA (n=1193)	91.53%	8.47%
P value	< 0.001	< 0.001

†Referral source was not known for 8 records and invasive/DCIS status was not known for 1 record.

Comments:

The majority of the New Zealand breast cancer episodes were invasive (85%). There was a significantly higher percentage of DCIS cases in the BSA referral group (24%) than in the non-BSA referral groups (8%).

Audit data used:

Information is derived from the audit question 'Invasive/In situ'.

Definitions[6]:

- Invasive – a cancer which has grown beyond its site of origin and invaded neighbouring tissue.
- DCIS – the presence of any malignant tumour which has not yet become invasive but is confined to the layer of cells from which it arose. A form of pre-invasive cancer.

1c. Private and public status of the episodes by referral source†

Referral source	Private	Public
BSA (n=801)	25.97%	74.03%
Non-BSA (n=1194)	37.44%	62.56%
P value	< 0 .001	< 0.001

†Referral source was not known for 8 records.

Comments:

The majority of the New Zealand patients were public (67%). The percentage of public patients was significantly higher in the BSA group (74%) than in the non-BSA group (63%).

Audit data used:

Information is derived from the audit question 'Private/Public' which allows the options of private/public.

Definitions[6]:

Private – a person who, on admission to a recognised hospital or soon after:

- elects to be a private patient treated by a medical practitioner of his or her choice
- elects to occupy a bed in a single room (where such an election is made, the patient is responsible for meeting certain hospital charges as well as the professional charges raised by treating medical practitioner or
- a person, eligible for public healthcare, who chooses to be admitted to a private hospital

Public – a person, eligible for public healthcare who on admission to a recognised hospital or soon after:

- receives a public hospital service free of charge or
- elects to be a public patient or
- whose treatment is contracted to a public hospital

1d. Age of the patients by referral source†

Referral source	≤40 years	40-44 years	45-50 years	51-60 years	61-70 years	>70 years
BSA (n=801)	0.62%	1.12%	20.35%	39.20%	37.45%	1.26%
Non-BSA (n=1194)	8.88%	11.64%	15.58%	17.00%	17.17%	29.73%
P value	< 0.001	<0.001	0.006	<0.001	<0.001	<0.001

†Referral source was not known for 8 records.

Comments:

The percentages of <45 year old patients and >70 year old patients were significantly lower in the BSA group (1.8%, 1.3%) than in the non-BSA group (20.5%, 29.7%). The percentages of patients in the 45 -70 year groups were significantly higher in the BSA than in the non-BSA group.

Audit data used:

Information is derived from a calculation using audit questions 'diagnosis date' and 'date of birth'. (If diagnosis date was not available the first 'surgery date' was used.)

Definitions[6]:

Diagnosis date: The date upon which the cancer diagnosis was definitively made, based upon cytology, core biopsy or open biopsy (e.g. the date that the procedure was done).
Surgery date: The date upon which breast cancer surgery was done.
Date of birth: Patient's date of birth.

1e. Gender of the patients by referral source†

Referral source	Female	Male
BSA (n=800)	100.00%	0.00%
Non-BSA (n=1194)	98.91%	1.09%
P value	Not calculated	Not calculated

†Referral source was not known for 8 records. Gender was not known for 1 BSA patient.

Comments:

Only 1% of the New Zealand patients were male and none of the male patients were referred from BSA for treatment.

Audit data used:

Information is derived from the audit question 'Gender' which allows the options of female/ male.

Definitions[6]:

Female: female patient; male: male patient

2. Invasive Tumour Characteristics

2a: Type of invasive tumour by referral source†

Referral source	1	2	3	4	5	6	7	8	9
BSA (n= 602)	76.91%	13.46%	0.00%	2.99%	1.83%	2.66%	0.17%	0.83%	1.16%
Non-BSA (n=1069)	76.15%	13.38%	0.00%	2.25%	2.43%	1.31%	0.75%	2.34%	1.40%
P value	0.724	.964	Not Calculated	0.380	0.420	0.046	0.118	0.026	0.679

†Referral source was not known for 5 invasive tumour records. Tumour types were not known for 5 BSA and 23 non-BSA patients.

1 – ductal carcinoma not otherwise specified (NOS); 2 - invasive lobular; 3 – special types; 4 – other invasive of mixed type; 5 – other neoplasm; 6 – tubular; 7 – medullary;
8 – mucinous; 9- basal like

Comments:
Most (76%) of the New Zealand invasive tumours were ductal carcinoma NOS. The percentage of tubular was significantly higher in patients referred through BSA (3%) than in the non-BSA group (1%). The percentage of mucinous tumours was significantly lower in BSA patients (1%) compared to the non-BSA group (2%). The percentages of other tumours were not significantly different between patients in the BSA and the non-BSA groups.

Audit data used:
Information is derived from the audit question 'Invasive histological type of tumour' which allows the options of ductal carcinoma NOS/invasive lobular/tubular/medullary/mucinous/other invasive of mixed type/other neoplasm/basal-like.

Definitions[6]:
Tumour type defines the microscopic appearance of the invasive breast cancer cells in the principal tumour.

2b: Size of invasive tumour by referral source†

Referral source	<10 mm	10-14 mm	15-19 mm	20-29 mm	30-39 mm	>40 mm
BSA (n=602)	28.74%	27.41%	16.94%	17.11%	4.82%	4.98%
Non-BSA (n=1070)	9.44%	16.54%	18.69%	26.26%	12.80%	16.26%
P value	<0.001	<0.001	0.372	<0.001	<0.001	<0.001

† Referral source was not known for 5 invasive tumour records. Invasive tumour size was not known for 5 BSA and 22 non-BSA patients.

Comments:

The percentage of patients with smaller tumours (< 15 mm) was significantly higher in the patients referred through BSA (56%) than in the non-BSA group (26%). The percentage of patients with larger tumours (>20 mm) was significantly higher in non-BSA group (55%) than in the BSA group (27%). The percentage of patients with 15-19 mm invasive tumours was not significantly different between BSA and the non-BSA groups.

Audit data used:

Information is derived from the audit question 'Invasive tumour size in mm'.

Definitions[6]:

Tumour size refers to the maximum diameter in millimetres of the furthest points of extension of the invasive tumour cells in the principal tumour.

2c: Histological grade of invasive tumour by referral source†

Referral source	Grade 1	Grade 2	Grade 3
BSA (n= 591)	32.83%	43.49%	23.69%
Non-BSA (n=1059)	21.53%	44.10%	34.37%
P value	< 0.001	0.810	< 0.001

† Referral source was not known for 5 invasive tumour records. Histological grade of the invasive tumours were not known for 16 BSA and 33 non-BSA patients.

Comments:

The percentage of patients with Grade 1 tumours was significantly higher in the BSA group (33%) than in the non-BSA group (22%). The percentage of patients with Grade 3 tumours was significantly higher in non-BSA group (34%) than in the BSA group (24%). There was no significant difference for the Grade 2 invasive tumours between BSA and non-BSA groups.

Audit data used:

Information is derived from the audit question 'invasive histological grade of tumour' which allows the options of Grade 1, Grade 2 and Grade 3.

Definitions[6]:

Histological grade is the degree of differentiation of the breast cancer or the degree to which it resembles normal tissue as assessed by the pathologist according to pathology reporting guidelines. The Histological grade is calculated by adding three scores (mitosis score, nuclear score and tubular differentiation score):

Grade 1 – Total score of 3-5
Grade 2 – Total score of 6-7
Grade 3 – Total score of 8-9

2d: Lymphatic vascular invasion of invasive tumour by referral source†

Referral source	Present	Absent
BSA (n= 504)	17.06%	82.94%
Non-BSA (n=898)	35.41%	64.59%
P value	< 0.001	< 0.001

† Referral source was not known for 5 invasive tumour records. Lymphatic vascular invasion was not known for 103 BSA and 194 non-BSA patients.

Comments:
In the majority (71%) of the New Zealand patients lymphatic vascular invasion was absent. The percentage of patients with vascular lymphatic invasion was significantly lower in the BSA group (17%) than in the non-BSA group (35%).

Audit data used:
Information is derived from the audit question 'Vascular/Lymphatic invasion' which allows the options of present/absent/unknown.

Definitions[6]:
Lymphatic vascular invasion present - tumour cells observed within the lumen of blood or lymphatic vessels.

2e: Bilateral synchronous status of invasive tumour by referral source†

Referral source	Bilateral synchronous	Not bilateral synchronous
BSA (n= 606)	3.63%	96.37%
Non-BSA (n=1092)	4.30%	95.70%
P value	0.501	0.501

† Referral source was not known for 5 invasive tumour records. Bilateral synchronous status for invasive tumours was not known for 1 BSA patient.

Comments:
Most (96%) of the invasive cancers in New Zealand patients were not bilateral synchronous and there was no significant difference in the percentage of bilateral synchronous cancers between the patients from BSA and non-BSA groups.

Audit data used:
Information is derived from the audit question 'Bilateral synchronous' which allows the options of no/yes.

Definitions[6]:
Bilateral synchronous cancers are the cancers that occur in both breasts simultaneously or sequentially within three months of time frame.

2f: Menopausal status for invasive tumour by referral source†

Referral source	Pre	Post	Peri
BSA (n=603)	15.09%	72.97%	11.94%
Non-BSA (n=1073)	35.04%	59.55%	5.41%
P value	< 0.001	< 0.001	< 0.001

† Referral source was not known for 5 invasive tumour records. Menopausal status was not known for 4 BSA females and 7 non-BSA females. There were 12 males in the non-BSA group.

Comments:

The majority (64%) of the New Zealand patients were post-menopausal. The percentage of pre-menopausal women was significantly lower in the BSA group (15%) than in non-BSA group (35%).

Audit data used:

Information is derived from the audit question 'Menopausal status' which allows the options of pre/post/peri/male.

Definitions[6]:

Pre – an individual who has not yet experienced the menopause

Post – an individual who has experienced the menopause and the occurrence of greater than one year of spontaneous amenorrhoea

Peri – an individual who is either in the period just prior to the menopause or the subsequent one year of amenorrhoea following the menopause

Male – male patient

2g: Oestrogen receptor status of invasive tumour by referral source†

Referral source	Positive	Negative
BSA (n=594)	88.38%	11.62%
Non-BSA (n=1063)	83.82%	16.18%
P value	0.011	0.011

† Referral source was not known for 5 invasive tumour records. Oestrogen receptor status was not known for 13 BSA and 29 non-BSA patients.

Comments:
Most (85%) of the New Zealand patients had oestrogen positive tumours. The percentage of patients with oestrogen positive tumours was significantly higher in the BSA group (88%) than in the non-BSA group (84%).

Audit data used:
Information is derived from the audit question 'Oestrogen receptor status' which allows the options of positive/negative/ordered but not known/not done.

Definitions[6]:
This records the presence or absence of oestrogen receptors on the tumour cells.

2h: Progesterone receptor status of invasive tumour by referral source†

Referral source	Positive	Negative
BSA (n=593)	73.86%	26.14%
Non-BSA (n=1055)	68.82%	31.18%
P value	0.031	0.031

†Referral source was not known for 5 invasive tumour records. Progesterone receptor status was not known for 14 BSA and 37 non-BSA patients.

Comments:
The majority (71%) of New Zealand patients had progesterone positive tumours. The percentage of patients with progesterone positive tumours was significantly higher in the BSA group (74%) than in the non-BSA group (69%).

Audit data used:
Information is derived from the audit question 'progesterone receptor status' which allows the following options: positive/negative/ordered but not known/not done.

Definitions[6]:
This records the presence or absence of progesterone receptors on the tumour cells.

2i: HER2 Receptor status of invasive tumour by referral source†

Referral source	Positive	Negative
BSA (n= 579)	13.82%	86.18%
Non-BSA (n=1002)	15.27%	84.73%
P value	0.432	0.432

† Referral source was not known for 5 invasive tumour records. HER2 status was not known for 28 BSA and 90 patients non-BSA patients.

Comments:

Most (85%) of the New Zealand patients had HER2 negative invasive tumours. The percentage of patients with HER2 negative tumours was not significantly different between the BSA group and the non-BSA group.

Audit data used:

Information is derived from the audit question 'HER2 receptor status' which allows the following options: positive/negative/ordered but not known/not done.

Definitions[6]:

HER2 stands for **H**uman **E**pidermal growth factor **R**eceptor 2

Positive – biopsy revealed abnormally high levels of the HER2 gene or protein

Negative – biopsy revealed a normal level of the HER2 gene or protein

3. DCIS Tumour Characteristics

3a: Size of DCIS tumours by referral source†

Referral source	<10 mm	10-14 mm	15-19 mm	20-29 mm	30-39 mm	>40 mm
BSA (n=193)	22.28%	15.03%	11.92%	19.17%	10.36%	21.24%
Non-BSA (n=95)	20.00%	11.58%	11.58%	15.79%	12.63%	28.42%
P value	0.658	0.426	0.933	0.483	0.565	0.178

† Referral source was not known for 3 DCIS records. DCIS tumour size was not known for 1 BSA and 6 non-BSA patients.

Comments:
Tumour size was not significantly different between patients in the BSA group and the non-BSA group.

Audit data used:
Information is derived from the audit question 'DCIS tumour size in mm'.

Definitions[6]:
Tumour size refers to the maximum diameter in millimetres of the furthest points of extension of the DCIS tumour cells in the principal tumour.

3b: Histological grade of DCIS tumour by referral source†

Referral source	Low	Intermediate	High
BSA (n=192)	8.85%	37.50%	53.65%
Non-BSA (n=93)	11.83%	35.48%	52.69%
P value	0.429	0.741	0.879

† Referral source was not known for 3 DCIS records. DCIS Histological grade was not known for 2 BSA and 8 non-BSA patients.

Comments:

The histological grade of the DCIS tumours was not significantly different between patients in the BSA and the non-BSA groups.

Audit data used:

Information is derived from the audit question 'DCIS histological grade of tumour' which allows the options low/intermediate/high.

Definitions[6]:

The degree of differentiation of the breast cancer or the degree to which it resembles normal tissue as assessed by the pathologist:
Low – well differentiated
Intermediate – moderately differentiated
High – poorly differentiated

3c: Necrosis of DCIS tumour by referral source†

Referral source	Absent	Present
BSA (n=184)	26.63%	73.37%
Non-BSA (n=86)	32.56%	67.44%
P value	0.315	0.315

† Referral source was not known for 3 DCIS records. Necrosis of the DCIS tumours was not known for 10 BSA and 15 non-BSA patients.

Comments:

The majority (71%) of New Zealand patients with DCIS tumours had necrosis. The percentage of patients with DCIS tumours with necrosis was not significantly different between BSA and non-BSA groups.

Audit data used:

Information is derived from the audit question 'necrosis of tumour' which allows the options of present/absent.

Definitions[6]:

Two categories of necrosis are recognised with DCIS: focal necrosis with no central necrosis and central necrosis in ducts.

Present – central necrosis is identified in ducts (this has previously been described as 'comedo' type necrosis.).

Absent – necrosis is not present or minimal. No central duct necrosis is present, but focal necrosis and isolated apoptotic cells may be present.

3d: Bilateral synchronous status of DCIS tumours by referral status†

Referral source	Bilateral synchronous	Not bilateral synchronous
BSA (n=194)	3.61%	96.39%
Non-BSA (n=101)	7.92%	92.08%
P value	0.110	0.110

† Referral source was not known for 3 DCIS records.

Comments:

DCIS tumours in most (95%) of the New Zealand patients were not bilateral synchronous. The percentage of patients with bilateral synchronous DCIS tumours was not significantly different between the BSA group and the non-BSA group.

Audit data used:

Information is derived from the audit question 'Bilateral synchronous' which allows the option of yes/no.

Definitions[6]:

Bilateral synchronous cancers are the cancers that occur in both breasts simultaneously or sequentially within three months of time frame.

3e: Menopausal status for the DCIS tumours by referral source†

Referral source	Pre	Post	Peri
BSA (n=188)	20.21%	59.57%	20.21%
Non-BSA (n=96)	30.21%	62.50%	7.29%
P value	0.061	0.633	0.005

† Referral source was not known for 3 DCIS records. Menopausal status was not known for 6 BSA and 4 non-BSA patients. There was 1 male from non-BSA referral sources.

Comments:

The majority (61%) of the New Zealand DCIS patients were post menopausal. The percentage of BSA patients with peri menopausal status was significantly higher in the BSA group (20%) than in the non-BSA group (7%). The percentage of DCIS patients with pre and post menopausal status was not significantly different between the BSA and non-BSA groups.

Audit data used:

Information is derived from the audit question 'Menopausal status' where the options are pre/peri/post/male.

Definitions[6]:

Pre – an individual who has not yet experienced the menopause[7]

Post – an individual who has experienced the menopause and the occurrence of 12 months of spontaneous amenorrhoea

Peri – an individual who is either in the period just prior to the menopause or the subsequent 1 year of amenorrhoea following the menopause

Male – Male patient

4. Breast Surgery Treatment

4a: First breast surgery performed for invasive cancer by referral source†

Referral source	None	Open Biopsy	CLE	Mastectomy	Other
BSA (n=607)	0.49%	3.46%	61.29%	33.77%	0.99%
Non-BSA (n=1092)	1.37%	4.12%	35.07%	58.70%	0.73%
P value	0.090	0.499	<0.001	<0.001	0.576

† Referral source was not known for 5 invasive tumour records. Surgery status was not known for 2 BSA patients and 2 non-BSA patients with breast surgery status unknown.

Comments:

The majority of the BSA patients (61%) had CLE and the majority of non-BSA patients had mastectomy (59%) as their first breast surgery.

4b: Further breast surgery after breast conserving surgery (open biopsy or CLE) for invasive cancer by referral source†

Referral source (for invasive tumours with BCS surgery)	Mastectomy	Re-excision	Other surgery	Any further surgery	No further breast surgery
BSA (n=393)	9.16%	9.16%	0.51%	16.79%	83.21%
Non-BSA (n=428)	14.02%	10.51%	0.23%	23.60%	76.40%
P value	0.030	0.516	0.514	0.016	0.016

† Referral source was not known for 4 BCS records for invasive tumours. Please note that some of the patients had re-excision and mastectomy both after BCS and therefore the percentage of any further surgery after BCS does not equal to the sum of the percentages of mastectomy, re-excision and other surgery after BCS.

Comments:

The majority (80%) of New Zealand patients had no further surgery after the breast conserving surgery for invasive tumour. The percentage of patients with further breast surgery after BCS for invasive tumours was significantly higher for non-BSA groups (24%) than the BSA group (17%).

4c: Reconstruction performed after mastectomy for invasive cancer by referral source

Referral source (for invasive tumours with mastectomy)	Reconstruction	No Reconstruction
BSA (n= 241)	16.60%	83.40%
Non-BSA (n=702)	15.53%	84.47%
P value	0.634	0.634

Comments:

The majority (83%) of New Zealand patients had no reconstruction after mastectomy for invasive cancer. The percentage of patients with reconstruction surgery after mastectomy for invasive tumours was not significantly different between the BSA and non-BSA groups.

4d: First breast surgery performed for DCIS cancer by referral source†

Referral source	None	Open biopsy	CLE	Mastectomy	Other
BSA (n=194)	0.00%	8.76%	60.31%	29.38%	1.55%
Non-BSA (n=101)	0.99%	12.87%	36.63%	46.53%	2.97%
P value	Not calculated	0.268	<0.001	0.003	0.411

† Referral source was not known for 3 DCIS tumours.

Comments:

The majority (69%) of New Zealand patients had breast conserving surgery (open biopsy or CLE) as their first surgery for DCIS cancer. The percentage of patients with breast conserving surgery (open biopsy or CLE) for DCIS tumours was significantly higher in the BSA group (69%) than in the non-BSA group (50%). The percentage of patients with mastectomy for DCIS tumours was significantly lower in the BSA group (29%) than in the non-BSA group (47%).

4e: Further surgery after breast conserving surgery for DCIS cancer by referral source†

Referral source (for DCIS tumours with BCS surgery)	Mastectomy	Re-excision	Other	Any further surgery	No further breast surgery
BSA (n=134)	16.42%	24.63%	1.49%	37.31%	62.69%
Non-BSA (n=50)	26.00%	22.00%	4.00%	48.00%	52.00%
P value	0.141	0.710	0.299	0.188	0.188

† Referral source was not known for 2 BCS records for DCIS tumours. Please note that some of the patients had re-excision and mastectomy both after BCS and therefore the percentage of any further surgery after BCS does not equal to the sum of the percentages of mastectomy, re-excision and other surgery after BCS.

Comments:

The majority (60%) of New Zealand patients had no further surgery after the breast conserving surgery for DCIS tumour. The percentage of patients with mastectomy after breast conserving surgery for DCIS tumours was not significantly different between BSA and non-BSA groups.

4f: Reconstruction performed after mastectomy for DCIS cancer by referral source†

Referral source (for DCIS tumours with mastectomy)	Reconstruction	No reconstruction
BSA (n=81)	41.98%	58.02%
Non-BSA (n=60)	45.00%	55.00%
P value	0.720	0.720

† Referral source was not known for 6 mastectomy records for DCIS tumours.

Comments

The majority (57%) of New Zealand patients had no reconstruction after mastectomy for DCIS cancer. The percentage of patients with reconstruction surgery after mastectomy for DCIS tumours was not significantly different between BSA and non-BSA groups.

Audit data used:

Information is derived from the audit question 'surgical procedures' which allows the options no surgery/ABBI/open biopsy/CLE/re-excision/total mastectomy/reconstruction/other.

Definitions[6]:

ABBI – the process whereby an Advanced Breast Biopsy Instrumentation System (or similar) technique is used to excise non-palpable breast lesions.

Open biopsy (including localisation) - surgical procedure in which a sample of breast tissue for histological examination is obtained in a conventional surgical procedure, using an open excision.

CLE - the complete excision of an entire tumour mass.

Re-excision – a secondary surgical procedure conducted to obtain a rim of normal breast tissue around the periphery of the previously removed primary tumour.

Total mastectomy - the surgical removal of the breast

Reconstruction – the use of a prosthesis or tissue from other parts of the body to re-build a breast.

Other – other surgery

5. Axillary surgery treatment

Relevant clinical practice guidelines

- Women with unifocal ≤ 3cm invasive tumours and clinically negative nodes should be offered sentinel node biopsy[1,3].
- Women with multifocal >3cm invasive tumours with clinically involved nodes axillary dissection is normally recommended[1,3].
- Axillary dissection should not be performed in the management of DCIS unless invasion is suspected[1,2].

NBCA KPIs[5]

- KPI 3 - Percent of cases undergoing axillary surgery for invasive cancer (>90%).
- KPI 4: Percent of cases not undergoing axillary surgery for DCIS which underwent breast conserving surgery (>90%).

5a. Axillary procedures for invasive cancer by referral source†

Referral source	No axillary surgery	SNB only	Level 1 only	Level 2 or 3	SNB & Level 1 only	SNB & Level 2 or 3
BSA (n=606)	2.48%	63.86%	0.83%	19.80%	0.83%	12.21%
Non-BSA (n=1082)	5.73%	36.60%	1.29%	41.50%	1.02%	13.86%
P value	0.002	<0.001	0.381	<0.001	0.697	0.337

† Referral source was not known for 5 invasive tumours. Axillary procedures were not known for 11 patients.

5b. Axillary procedures for ≤3cm invasive cancer by referral source†

Referral source	No axillary surgery	SNB only	Level 1 only	Level 2 or 3	SNB & Level 1 only	SNB & Level 2 or 3
BSA (n=551)	2.18%	68.42%	0.91%	15.79%	0.91%	11.80%
Non-BSA (n=802)	4.99%	45.89%	1.00%	32.04%	1.00%	15.09%
P value	0.008	<0.001	0.867	<0.001	0.867	0.084

† Tumour size was missing for 5 BSA and 20 non-BSA patients. For ≤ 3 cm tumours, referral source was not known for 5 patients.

5c. Axillary procedures for >3cm invasive cancer by referral source by referral source†

Referral source	No axillary surgery	SNB only	Level 1 only	Level 2 or 3	SNB & Level 1 only	SNB & Level 2 or 3
BSA (n=50)	2.00%	16.00%	0.00%	64.00%	0.00%	18.00%
Non-BSA (n=260)	3.85%	9.23%	2.31%	71.92%	1.15%	11.54%
P value	0.518	0.150	Not calculated	0.260	Not calculated	0.207

† Tumour size was missing for 5 BSA and 20 non-BSA patients.

Comments: A significantly higher percentage of BSA patients had SNB as their only axillary surgery than non-BSA patients in ≤3cm tumour group but this difference was not present in >3 cm tumour group. A significantly higher percentage of non-BSA patients had Level 2 or Level 3 as their only axillary surgery than the BSA patients in ≤3cm tumour group but this difference was not present in >3 cm tumour group. As expected from the Guidelines a higher percentage of patients had Level 2 or Level 3 axillary surgery for >3cm tumours (71%) than for ≤ 3cm tumours (25%).

5d. Axillary procedures for DCIS cancer which only had breast conserving surgery by referral source†

Referral source	No axillary surgery	SNB only	Level 1 only	Level 2 or 3 only	SNB & Level 1	SNB & Level 2 or 3
BSA (n=102)	84.31%	14.71%	0.00%	0.00%	0.98%	0.00%
Non-BSA (n=36)	77.78%	19.44%	0.00%	0.00%	0.00%	2.78%
P value	0.374	0.504	Not calculated			

† 2 with not known referral sources. There were 5 patients with not known axillary procedure for DCIS with BCS.

5e. Axillary procedures for DCIS cancer which had mastectomy by referral source†

Referral source	No axillary surgery	SNB only	Level 1 only	Level 2 or 3 only	SNB & Level 1	SNB & Level 2 or 3
BSA (n=81)	27.16%	70.37%	2.47%	0.00%	0.00%	0.00%
Non-BSA (n=57)	26.32%	61.40%	3.51%	7.02%	0.00%	1.75%
P value	0.912	0.271	0.720	Not calculated		

† 6 with not known referral sources. There were 3 patients with not known axillary procedure for DCIS with mastectomy

Comments:

Most (83%) of the New Zealand patients with DCIS tumours had no axillary surgery after breast conserving surgery as expected from the Guidelines. Axillary procedure use was not significantly different for these patients in either BSA or non-BSA groups. The majority (73%) of the New Zealand patients with DCIS tumours had axillary surgery after mastectomy.

Audit data used:

Information on the axillary procedure is from the audit question 'Axillary surgery' which allows the options sentinel node biopsy/level 1 sampling/level 2/level 3/no axillary surgery.

Definitions[6]:

Axillary surgery - The surgical excision of the axillary contents (fat and lymph nodes) *en bloc* with mastectomy or as an independent procedure.

Sentinel Node Biopsy - The identification and excision of the sentinel lymph node (the first node(s) draining the primary tumour in the regional lymphatic basin) from patients with invasive breast cancer

Level 1 - The excision of a single, low axillary node or the excision of the axillary contents up to the inferior border of the pectoralis minor muscle, includes sampling

Level 2 – Excision of the axillary contents up to the superior border of the pectoralis minor muscle

Level 3 - Excision of the axillary contents up to the apex of the axilla

6. Margins of excision for breast surgery

6a. Margins of excision for invasive cancer by referral source†

Referral source	Margin size =0 mm	Margin size > 0 mm and ≤ 1 mm	Margin size ≥ 2 mm
BSA (n=574)	3.66%	7.32%	89.02%
Non-BSA (n=1007)	3.97%	10.82%	85.20%
P value	0.756	0.023	< 0.032

† Referral source was not known for 5 cases. Margin size was not known for 33 BSA and 85 non-BSA patients for invasive tumours.

Comments:
Most (87%) of the New Zealand patients had ≥2 mm margins after surgery for invasive cancer. The percentage of patients with ≥2 mm margins after surgery for an invasive tumour was significantly higher in the BSA group (90%) than in the non-BSA group (85%). The percentage of patients with involved margin after the surgery for an invasive tumour was low (4%) and was not significantly different between the BSA and non-BSA groups.

6b. Margins of excision for DCIS cancer by referral source†

Referral source	Margin size =0 mm	Margin size > 0 mm and ≤ 1 mm	Margin size ≥ 2 mm
BSA (n=184)	7.07%	15.76%	77.17%
Non-BSA (n=92)	13.04%	14.13%	72.83%
P value	0.103	0.722	0.427

† Referral source was not known for 3 cases. Margin size was not known for 10 BSA and 9 non-BSA patients for DCIS tumour.

Comments:
Most (76%) of the New Zealand patients had ≥2 mm margins after surgery for DCIS cancer. The margin size for DCIS tumours was not significantly different between the BSA group and non-BSA group.

Audit data used:
Information on clear margin is derived from the audit question 'Distance (in mm) to closest circumferential margin' and 'Distance (in mm) to closest vertical margin' which allows the user entry of margin size in millimetres.

Definitions[6]:
Margin size = lowest value recorded for vertical margin or circum margin.

7. Radiotherapy treatment

NBCA KPIs[5]

- KPI 1: Percent of invasive tumours treated with breast conserving surgery (BCS) that were referred for or prescribed radiotherapy (≥85%).
- KPI 4 (proposed): High risk mastectomy cases that were referred for prescribed radiotherapy (invasive tumour size ≥ 50 mm) OR (invasive tumours with ≥ 4 positive lymph nodes) (≥85%).

7a: Radiotherapy for invasive cancer which only had breast conserving (CLE or open biopsy) surgery by referral source†

Referral source	Radiotherapy prescribed	Radiotherapy not prescribed
BSA (n=345)	95.94%	4.06%
Non-BSA(n=350)	95.43%	4.57%
P value	0.739	0.739

† Referral source was not known for 3 BCS invasive cases. Radiotherapy was not known for 9 BSA and 16 non-BSA patients. Please note that the patients who had mastectomy or reconstruction or other surgery after breast conserving surgery were not included in this group.

Comments:

The percentage of patients with prescribed radiotherapy treatment after breast conserving surgery for invasive cancer was not significantly different between the BSA and non-BSA groups.

7b: Radiotherapy for invasive cancer which had mastectomy by referral source†

Referral source	Radiotherapy prescribed	Radiotherapy not prescribed
BSA (n=234)	29.06%	70.94%
Non-BSA (n=685)	45.40%	54.60%
P value	<0.001	<0.001

† Referral source was not known for 2 invasive mastectomy cases and radiotherapy status was not known for 7 BSA and 17 non-BSA patients.

Comments:

The percentage of patients with prescribed radiotherapy treatment after mastectomy for invasive cancer was significantly lower in the BSA group (29%) than in the non-BSA group (45%).

7c: Radiotherapy for high risk invasive cancer (invasive tumour size ≥ 50 mm OR invasive tumours with ≥ 4 positive lymph nodes) which had mastectomy by referral source†

Referral source	Radiotherapy prescribed	Radiotherapy not prescribed
BSA (n=36)	83.33%	16.67%
Non-BSA (n=191)	87.96%	12.04%
P value	0.446	0.446

† There were 1 patient from BSA and 2 patients from non-BSA referral sources with not known radiotherapy data.

Comments:

The percentage of patients with prescribed radiotherapy treatment after mastectomy for high risk invasive cancer was not significantly different between BSA and non-BSA groups. The percentage of patients receiving radiotherapy in high risk mastectomy group is much higher than in the whole mastectomy group.

7d: Radiotherapy for DCIS cancer which only had breast conserving (CLE or open biopsy) surgery by referral source†

Referral source	Radiotherapy prescribed	Radiotherapy not prescribed
BSA (n=106)	86.79%	13.21%
Non-BSA (n=36)	69.44%	30.56%
P value	0.018	0.018

† Referral source was not known for 2 DCIS tumours with BCS. Radiotherapy status was not known for 1 BSA patients. Please note that the DCIS patients who had mastectomy or reconstruction or 'other surgery' after breast conserving surgery were not excluded in this group.

Comments:

The majority (82%) of New Zealand patients had radiotherapy after breast conserving surgery for DCIS tumours. There percentage of patients prescribed radiotherapy for DCIS was significantly higher in the BSA group than in the non-BSA group.

7e: Radiotherapy for DCIS cancer which had mastectomy by referral source†

Referral source	Radiotherapy prescribed	Radiotherapy not prescribed
BSA (n=80)	10.00%	90.00%
Non-BSA (n=54)	11.11%	88.89%
P value	0.837	0.837

† Radiotherapy status was not known for 1 BSA and 6 non-BSA patients.

Comments:

Only a small percentage (10%) of the New Zealand patients had radiotherapy treatment after mastectomy for DCIS cancer. There was no significant difference for the radiotherapy treatment after mastectomy for DCIS cancer between BSA and non-BSA groups.

Audit data used:

Information on patients undergoing radiotherapy is derived from the audit question 'Did you prescribe or refer for any of the following adjuvant therapies?' where one of the options is radiotherapy. The options are yes/no/not yet/referred but not used/not known.

Definitions[6]:

Radiotherapy is the use of radiation, usually x-rays or gamma rays, to kill tumour cells.

8. Hormonal treatment

NBCA KPIs[5]

- KPI 2: Percent referred or prescribed hormonal treatment for oestrogen positive invasive tumours (≥85%).

8a. Hormonal treatment for oestrogen positive invasive cancer by referral source†

Referral source	Hormonal treatment	No hormonal treatment
BSA (n=504)	82.54%	17.46%
Non-BSA (n=840)	87.02%	12.98%
P value	< 0.024	< 0.024

Referral source	Meno status	Any horm'l treatm't	Tamox'n only	Tamoxifen & Ovarian ablation	Tamoxifen & Aromatase inhibitors	Ovarian ablation only	Ovarian ablation & Aromatase inhibitors	Aromatase inhibitors only	All three hormonal treatm'ts	No hormonal treatm't
BSA (504)	Any	82.54%	38.49%	0.00%	11.51%	0.00%	0.20%	32.14%	0.20%	17.46%
Non-BSA (840)	Any	87.02%	49.88%	0.24%	8.45%	0.00%	0.24%	27.98%	0.24%	12.98%
P value		0.024	<0.001	NC	0.066	NC	0.691	0.105	0.691	0.024
BSA (n=71)	pre	77.46%	69.01%	0.00%	4.23%	0.00%	0.00%	4.23%	0.00%	22.54%
Not SA (n=271)	pre	88.19%	77.49%	0.37%	7.38%	0.00%	0.37%	2.58%	0.00%	11.81%
P value		0.021	<0.001	NC	0.345	NC	NC	0.465	NC	0.021
BSA (n=61)	peri	85.25%	60.66%	0.00%	11.48%	0.00%	0.00%	11.48%	1.64%	14.75%
Non-BSA (n=45)	peri	93.33%	64.44%	0.00%	4.44%	0.00%	0.00%	22.22%	2.22%	6.67%
P value		0.194	0.691	NC	0.199	NC	NC	0.075	0.827	0.194
BSA (n=369)	post	83.74%	29.27%	0.00%	13.01%	0.00%	0.27%	41.19%	0.00%	16.26%
Non-BSA (n=508)	post	86.02%	33.27%	0.20%	9.45%	0.00%	0.20%	42.72%	0.20%	13.98%
P value		0.349	0.208	NC	0.096	NC	0.82	0.652	NC	0.349
BSA (n=0)	Male	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Non-BSA (n=11)	Male	100%	82.00%	0.00%	9.00%	0.00%	0.00%	9.00%	0.00%	0.00%
P value		NC	NC	NC	NC	NC	NC	NC	NC	NC
BSA (n=3)	unknown	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	100%
Non-BSA (n=5)	unknown	40.00%	40.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	60.00%
P value		NC	NC	NC	NC	NC	NC	NC	NC	NC

† NC – not calculated; Meno status – Menopausal status

Referral source was not known for 5 invasive tumour records. Oestrogen receptor status was not known for 13 BSA and 29 non-BSA patients. Hormonal treatment was not known for 24 BSA and 109 non-BSA patients for oestrogen positive invasive tumours.

8b. Hormonal treatment for oestrogen negative invasive cancer by referral source†

Referral source	Hormonal treatment	No hormonal treatment
BSA (n=69)	4.35%	95.65%
Non-BSA (n=170)	7.65%	92.35%
P value	0.355	0.355

Referral source	Meno status	Any hormonal treatm't	Tamox'n only	Tamox'n & Ovarian ablation	Tamoxifen & Aromatase inhibitors	Ovarian ablation only	Ovarian ablation & Aromatase inhibitors	Aromatase inhibitors	All three hormonal treatm'ts	No hormonal treatment
BSA (504)	Any	4.35%	0.00%	0.00%	2.90%	0.00%	0.00%	1.45%	0.00%	95.65%
Non-BSA (840)	Any	7.65%	2.35%	0.00%	1.76%	0.59%	0.00%	2.94%	0.00%	92.35%
P value		0.355	NC	NC	0.579	NC	NC	0.504	NC	0.355
BSA (n=71)	pre	7.69%	0.00%	0.00%	7.69%	0.00%	0.00%	0.00%	0.00%	92.31%
NotBSA (n=271)	pre	7.50%	3.75%	0.00%	2.50%	1.25%	0.00%	0.00%	0.00%	92.50%
P value		0.981	NC	NC	0.326	NC	NC	NC	NC	0.981
BSA (n=61)	peri	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	100.00%
Non-BSA (n=45)	peri	20.00%	20.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	80.00%
P value		NC	NC	NC	NC	NC	NC	NC	NC	NC
BSA (n=369)	post	4.00%	0.00%	0.00%	2.00%	0.00%	0.00%	2.00%	0.00%	96.00%
Non-BSA (n=508)	post	7.06%	0.00%	0.00%	1.18%	0.00%	0.00%	5.88%	0.00%	92.94%
P value		0.467	NC	NC	0.702	NC	NC	0.290	NC	0.467
BSA (n=0)	Male	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Non-BSA (n=11)	Male	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
P value		NC	NC	NC	NC	NC	NC	NC	NC	NC
BSA (n=3)	unknown	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Non-BSA (n=5)	unknown	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
P value		NC	NC	NC	NC	NC	NC	NC	NC	NC

† NC – not calculated; Meno status – Menopausal status

Referral source was not known for 5 records. Oestrogen receptor status was not known for 13 BSA and 29 non-BSA patients. Hormonal treatment was not known for 2 non-BSA patients for oestrogen negative invasive tumours.

Comments:

Most (85%) of the New Zealand patients with oestrogen positive tumours had hormonal treatment. The percentage of patients with prescribed hormonal treatment for oestrogen positive invasive tumours was significantly lower in the BSA group (83%) than in the non-BSA group (87%). A small percentage (7%) of the New Zealand patients with oestrogen negative tumours had hormonal treatment. The percentage of these patients was not significantly different between BSA and non-BSA groups.

Audit data used:

Information for oestrogen receptor positive status is derived from the audit question 'Receptor status' where information is recorded for oestrogen and progesterone status with options of positive/negative/ordered but not known/not done.

Information for number of patients prescribed and/or referred hormonal therapies is derived from the question 'Did you prescribe or refer for any of the following adjuvant therapies?'where the options are yes/no/not yet/referred but not used.

Definitions[6]:

Oestrogen receptors are prognostic indicators. They are an intracellular receptor protein that binds oestrogens and anti-oestrogens and mediate their effects by binding to DNA and altering the expression of specific genes.

Hormonal treatment – tamoxifen (SERMs), aromatase inhibitors, ovarian ablation

SERMs- The use of Selective Oestrogen Receptor Modulators to inhibit the growth of hormone responsive cancer cells after primary treatment either by surgery or radiotherapy or a combination of these to eradicate micro metastatic cancer.

Aromatase inhibitors – These are a class of drugs which lower the level of oestrogen in the tumour. They are primarily used in post-menopausal patients.

Ovarian ablation – The use of surgery, radiation or drug treatment to cease hormone production by the ovaries, after primary treatment either by surgery or radiotherapy or a combination of these (usually within six weeks) to eradicate micro metastatic cancer.

9. Chemotherapy treatment

9a. Chemotherapy treatment for invasive cancer for ≤ 70 years old patients by referral source†

Referral source	Chemotherapy prescribed	Chemotherapy not prescribed
BSA (n=580)	37.59%	62.41%
Non-BSA (n=728)	64.97	35.03
P value	< 0.001	< 0.001

Referral source	Chemotherapy prescribed			Chemotherapy not prescribed		
	Oestrogen/Progesterone			Oestrogen/Progesterone positive		
	Positive	Negative	Unknown	Positive	Negative	Unknown
BSA (n=580)	27.59%	10.00%	0.00%	59.48%	1.90%	1.03%
Non-BSA (n=728)	47.53%	17.17%	0.27%	32.55%	1.10%	1.37%
P value	<0.001	<0.001	Not calculated	<0.001	0.231	0.579

† Referral source was not known for 5 invasive tumour records. Chemotherapy status was not known for 49 records.

Comments:

The percentage of patients ≤70 years old with prescribed chemotherapy treatment was significantly lower in the BSA group (38%) than in the non-BSA group (65%).

9b. Chemotherapy treatment for invasive cancer for > 70 years old patients by referral source†

Referral source	Chemotherapy prescribed	Chemotherapy not prescribed
BSA (n=7)	14.29%	85.71%
Non-BSA (n=326)	16.56	83.44
P value	0.859	0.859

Referral source	Chemotherapy prescribed			Chemotherapy not prescribed		
	Oestrogen/Progesterone			Oestrogen/Progesterone positive		
	Positive	Negative	Unknown	Positive	Negative	Unknown
BSA (n=7)	14.29%	0.00%	0.00%	85.71%	0.00%	0.00%
Non-BSA (n=326)	11.96%	4.60%	0.00%	76.69%	5.83%	0.92%
P value	0.852	Not calculated	Not calculated	0.575	Not calculated	Not calculated

† Chemotherapy status was not known for 9 records.

Comments:

Most of the New Zealand patients >70 year old (83%) did not receive chemotherapy treatment. There was no significant difference between the chemotherapy treatment for these patients between BSA and non-BSA groups.

Audit data used:

Information on chemotherapy is derived from the audit question 'Did you prescribe or refer for any of the following adjuvant therapies?' where one choice is Chemotherapy. The options are yes/no/not yet/referred but not used.

Definitions[6]:

Chemotherapy is the use of cytotoxic drugs that aim to kill, prevent or slow the growth rate of cancer cells.

10. Herceptin (trastuzumab) treatment

Relevant Clinical Practice Guidelines

Patients with early breast cancer and HER-2 positive tumours, either node positive or node negative with tumours larger than 1cm, should be offered trastuzumab with chemotherapy following surgery[4].

10a. Herceptin (trastuzumab) treatment for >1cm OR node positive HER2 positive invasive cancer by referral source†

Referral source	Herceptin prescribed			Herceptin not prescribed
	Chemo yes	Chemo no	Chemo unknown	
BSA (n=58)	70.69%	0.00%	0.00%	29.31%
Non-BSA (n=133)	72.93%	0.75%	0.00%	26.32%
P value	0.750	Not calculated		0.669

† Referral source was not known for 1 record. HER2 status was not known for 1 BSA and 7 non-BSA patients. Herceptin treatment was not known for 6 non-BSA patients.

Comments:

The majority (73%) of the New Zealand patients with HER2 positive >1 cm or node positive tumours received Herceptin treatment. There was no significant difference between the BSA and non-BSA patients for Herceptin treatment.

10b. Herceptin (trastuzumab) treatment for HER2 negative invasive cancer by referral source†

Referral source	Herceptin prescribed			Herceptin not prescribed
	Chemo yes	Chemo no	Chemo unknown	
BSA (n=487)	0.21%	0.62%	0.00%	99.18%
Non-BSA (n=835)	0.24%	0.24%	0.00%	99.52%
P value	0.900	0.282	Not calculated	0.439

† Referral source was not known for 5 invasive tumour records. HER2 status was not known for 1 BSA and 7 patients non-BSA patients. Herceptin treatments was not known for 12 BSA and 14 non-BSA patients with HER2 negative receptor status.

Comments:

A very small percentage (0.6%) of HER2 negative patients has been prescribed Herceptin and there is no significant difference between BSA and non-BSA patients.

Audit data used:

Information on chemotherapy derived from the audit question 'Did you prescribe or refer for any of the following adjuvant therapies?' where one choice is Herceptin or other immunotherapy and the options were yes/no/not yet/referred but not used.

Definitions[6]:

Herceptin is a drug aimed at patients who show HER2 gene amplification and/or protein over expression.

11. Summary

While the majority of breast cancer cases from New Zealand were referred as symptomatic from a GP (52%), BSA was the second most common referral source for New Zealand breast cancer patients (40%).

The majority (85%) of the New Zealand cases were invasive breast cancer. The percentage of DCIS cancer was higher in the BSA group (24%) compared to the non-BSA group (8%).

More of BSA patients were public (74%) compared to non-BSA patients (63%).

The percentage of patients in the 45-70 year group was significantly higher in the BSA group than in the non-BSA group.

Only 1% of the New Zealand patients were males and none of the male patients were referred from BSA for the treatments.

There were some significant differences between BSA and non-BSA patients for the invasive tumour characteristics and accordingly there were significant differences in some of the breast cancer treatments between BSA and non-BSA patients.

<u>Significantly different invasive tumour characteristics and treatments between BSA and non-BSA patients</u>

- Higher percentage of BSA patients (3%) had Tubular tumours compared to non-BSA patients (1%). Lower percentage of BSA patients (1%) had Mucinous tumours compared to non-BSA patients (2%).
- Higher percentage of BSA patients (56%) had smaller (<15 mm) tumours compared to non-BSA patients (26%).
- Lower percentage of BSA patients (27%) had larger tumours (>20 mm) compared to non-BSA patients (55%).
- Higher percentage of BSA patients (33%) had invasive Grade 1 tumours compared to non-BSA patients (22%).
- Lower percentage of BSA patients (24%) had Grade 3 tumours compared to non-BSA patients (34%).
- Lower percentage of BSA patients (17%) had lymphatic vascular invasion compared to non-BSA patients (35%).

- Lower percentage of BSA patients (15%) were pre menopausal compared non-BSA patients (35%)

- Higher percentage of BSA patients (88%) had oestrogen positive tumours compared to non-BSA patients (84%).

- Higher percentage of BSA patients (74%) had progesterone positive tumours compared to non-BSA patients (69%).

- The majority of BSA patients (61%) had CLE as their first breast surgery. The majority of non-BSA patients had mastectomy as their first breast surgery (59%). Significantly lower percentage of BSA patients (17%) had further breast surgery after breast conserving surgery than non-BSA patients (24%).

- For ≤ 3cm tumours, higher percentage of BSA patients (68%) had SNB as their only axillary surgery compared to non-BSA patients (46%). Lower percentage of BSA patients (16%) had Level 2 or Level 3 as the only axillary surgery compared to non-BSA patients (32%). (Axillary procedures for >3cm invasive cancer was not significantly different between BSA and non-BSA groups.)

- Higher percentage of BSA patients (89%) had ≥ 2 mm margins compared to non-BSA patients (85%).

- Lower percentage of BSA patients (29%) was prescribed radiotherapy after mastectomy compared to non-BSA patients (45%).

- Lower percentage of BSA patients (83%) was prescribed hormonal treatment compared to non-BSA patients (87%).

- Lower percentage of BSA ≤ 70 year old patients (38%) was prescribed chemotherapy compared to non-BSA patients (65%).

<u>Significantly different DCIS tumour treatments between BSA and non-BSA patients</u>

- Higher percentage of BSA patients (60%) had breast conserving surgery (CLE) as their first breast surgery compared to non-BSA patients (37%). Lower percentage of BSA patients (29%) had mastectomy as a first surgery compared to non-BSA patients (47%).

- Higher percentage of BSA patients (87%) was prescribed radiotherapy after breast conserving surgery compared to non-BSA patients (69%).

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